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Abstract

This article examines the effect of the Personal Responsibility and Work Opportunity Reconciliation Act of 1996 on state budget shares for public welfare programs between 1991 and 2011. The model is a composite of prior research. In particular, I utilize a balance wheel model adjusted to model budget shares. This model shares many similarities with prior political economy model. Welfare Reform ended many traditional welfare programs and created new ones with more restrictions on recipients. Prior research shows that expenditures have fallen for traditional programs, but little is concluded about new programs and overall expenditures on public welfare programs as they relate to the total budget. The findings of this research are largely inconclusive, but more data and stronger tests could confirm or reject the null hypotheses with more robustness.

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In 1996, dramatic changes were made to traditional public welfare programs. The Personal Responsibility and Work Opportunity Reconciliation Act of 1996 (PRWORA) changed the way in which the federal government and states are involved in welfare. The primary purposes of welfare reform were to decrease poverty, increase employment, and encourage families to stay together while providing more flexibility in how states provide assistance (Sawhill, 1995). The largest change was the ending of Aid to Families with Dependent Children (AFDC) and the creation of Temporary Assistance for Needy Families (TANF). Essentially, the act ended open ended funding and created a system in which the federal government provides block-grants to states to fund welfare (DHHS). Further, it limited the amount of time one could be on welfare and placed work requirements on many recipients (DHHS). It also resulted in changes to the Food Stamp Program, child welfare, benefits to legal immigrants, child nutrition programs, and reduced the Social Services Block Grant (DHHS) while allowing states to implement programs as they saw fit.

Many researchers have noted that expenditures on traditional welfare programs have fallen since PRWORA was implemented. In particular, spending on TANF has fallen as a result of the many restrictions placed on the receipt of welfare. Unfortunately, much of the research focuses on traditional programs and only acknowledges that other programs have been implemented at the state level. Hence, we can say little about the state of welfare beyond the traditional programs. If there are indeed negative consequences as a result of welfare reform, as many note, then this raises some ethical dilemmas over fairness and equality. In particular, it raises the need for further reform to the US welfare system that may include more federal government involvement to ensure equal treatment across states. If states are indeed implementing their own programs and moving away from traditional welfare, then it raises concerns about people receiving different benefits based on their state of birth.

The major goal of this research is to determine whether or not welfare reform in 1996

resulted in states changing their public welfare budget shares such that welfare received a smaller proportion of the budget after welfare reform when compared to prior years. I will simultaneously look for relationships between budget allocations and the makeup of the population, economic indicators, and other relevant characteristics that may affect welfare. If I find systematic differences across states, then perhaps potential solutions can be formed to create a more equal system in which the home state does not affect a person's ability to get assistance in a time of need.

Literature Review

Ever since welfare reform was passed, the topic has been of much interest among researchers. Bentele and Nicoli (2012) investigated whether or not the Personal Responsibility and Work Opportunity Reconciliation Act of 1996 (PRWORA) led to decreases in state level spending on social welfare, in particular, Temporary Assistance for Needy Families (TANF). The main purpose of the study was to examine factors that have contributed to declines in welfare coverage among states. Bentele and Nicoli based their study on previous work showing that the number of welfare caseloads has declined since 1996. They utilized common predictors of welfare participation and coverage. Their hypotheses included increasing coverage as unemployment increases, higher female employment results in higher coverage or no change at all, wealthier states will have higher coverage, states with republican governors will have larger decreases in coverage than states with liberal governors, and that the percent of the state population that is black will affect coverage. Utilizing a Multilevel Model of Change which allows examinations of change within and across states, the authors suggest that welfare reform resulted in lower welfare coverage at the state level. While this is an important result, the authors acknowledged that there were other programs that may be causing the decrease and even then, much of the decrease is unaccounted for. Future studies should look at spending on social services as a whole to examine whether spending has shifted to other parts of the budget in order to determine if welfare reform had the negative effect indicated.

Prior to Bentele and Nicoli, several studies showed that welfare reform resulted in decreased coverage. De Jong et al. (2007) examined common policies regarding social welfare adopted across states and whether or not policy stringency diffused across states. The article is based on rules regarding welfare put out by the Urban Institute and the PRWORA legislation's implications. The primary hypotheses were that after welfare reform, states adopted more stringent policies regarding welfare and that policy changes diffused across states. De Jong et al. utilized factor analysis which leads to measures of policy types. They used data reduction to find overall trends. Once they reduced the data, they used OLS regression modeling. Their longitudinal data comes mainly from the Urban Foundation's "Welfare Rules Databook" which lists policies for all states. In total, they reduced the data to 15 important policies across 50 states from 1996-2003 for a total of 8 years. This study from De Jong et al. offers an important summary of changes in policy across states, which is useful when trying to determine what will impact change in policy. When examining state budgets, this work provides a basis for

determining how spending on social welfare may have changed in a given state.

Another study by Danielson and Klerman (2008) implied that welfare reform was responsible for roughly 10% of the decrease in welfare caseloads while 5% was explained by the economy which leaves much of the decrease in caseloads unexplained. Their study was based on inconclusive prior work that indicated that welfare reform may have resulted in a decrease in caseloads. Their study also utilized the legislation itself which gave more authority to states and restricts access to welfare, all of which suggested decreases in caseloads and welfare spending. The primary hypothesis was that welfare reform reduced state welfare caseloads. Secondary hypotheses were that time limits reduce caseloads, benefits declining with increases in income reduce caseloads, penalties for noncompliance reduce caseloads, and finally that alternated assistance programs reduce caseloads. The authors utilized a difference in differences model of change where changes in caseloads are dependent on policies. One important point not covered in their study is the side programs which affect overall spending and may cover the reduction in TANF participation and spending. Essentially, their study fails to explain whether or not welfare has been reduced overall which should be covered in the future.

Since PRWORA was partially enacted with the intent of reducing poverty, Li and Upadhyay (2008) analyze whether or not PRWORA actually reduced poverty in the U.S.. Prior work indicates that welfare reform may have had an impact on poverty among certain groups, but the evidence is lacking and should be considered carefully. The authors carefully accounted for determinants of poverty to determine if welfare reform had an effect. The authors provided some key variables that may be used to explain poverty rates which should be included in any model of social welfare spending. Using the poverty rate by itself could be problematic due to its relationship to dependent variables, but by utilizing the variables provided in their study, that problem is reduced by using exogenous variables. The authors also provide some indication of the number of people who seek welfare based on poverty, which could affect state spending on social services. Ultimately, the authors found little evidence that PRWORA decreased poverty.

While it is commonly acknowledged that TANF spending has decreased as a result of PRWORA, little work has been done on whether or not overall welfare spending has decreased. TANF is one among many programs. PRWORA allows states to spend their block grants as they see fit with their own restrictions on recipients. While previous research suggests that spending on welfare programs has decreased, little can actually be said about whether welfare has decreased as a whole instead of one individual program shrinking. In order to account for changes in state budget size, welfare will be examined as a percentage of the budget instead of as a nominal or real value.

Economic Theory

The Personal Responsibility and Work Opportunity Reconciliation Act of 1996 (PRWORA) altered the way in which welfare funds are allocated to states. In particular, the federal government halted open ended funding for welfare and implemented a block grant system in

which states receive a fixed amount, which they can choose to do with as they wish. The largest portion is the switch from Aid to Families with Dependent Children (AFDC) to Temporary Assistance for Needy Families (TANF). The changes limit welfare receipt to five years over the course of a person's life, create incentives to combine work with welfare, require recipients to participate in work or training at the risk of losing welfare, and allow states to add further restrictions as they see fit (Martin and Caminada, 2011; Danielson and Klerman, 2009; Kassabian, Whitesell, and Huber, 2012). Several authors have concluded that poverty has not been reduced as a result of PRWORA and the switch to TANF has resulted in less funding for social welfare and fewer applicants for welfare; however, no work has been done on how state budget allocations have been impacted by PRWORA. If funding for social welfare has fallen as research has shown, then it is likely that the percentage of the budget that is allocated to public welfare also decreased, but one must control for changes in the size of the budget and as well as other relevant variables that impact allocations as well.

The empirical model and variables will be largely based on prior work by Baicker (2001) who utilizes a political economy model to estimate government expenditures on various programs. Her model is based on the median voter maximizing their utility by choosing transfer levels subject to a state government budget constraint. This constraint is specified as tax revenue being equivalent to expenditures in the form of transfers. Baicker also includes a constraint specifying changes in intergovernmental transfers. Delaney and Doyle (2011) use a similar balance wheel model that focuses primarily on education expenditures, but is still based on a political economy model that maximizes voter utility. I will use a combination of variables from both models to estimate the effects of welfare reform. Ultimately, state expenditures are dependent on variables such as unemployment and income which can positively and negatively impact the median voter and their preferences for who receives welfare. Various demographic variables that represent the median voter are also considered as well as various shocks such as changes in the government's ideology, recessions, and of course, changes in how welfare is provided at the state level.

The most important variables for consideration in how states allocate their budget are economic indicators (Bentele and Nicoli, 2012). Thus, consideration will be made for state unemployment and per capita income. Since welfare spending is primarily dependent on unemployment, this variable must be taken into consideration. If unemployment increases, then we would expect to see an increase in demand for public welfare programs such as food stamps and unemployment insurance. The median voter would also be more supportive of these programs as the likelihood that they may need welfare could increase. Although per capita income is a more common measure of income, median income may better reflect the median voter's income, particularly with the potential for rising inequality to skew per capita income disproportionately upward. A lower median income would decrease the median voters ability to provide for themselves which should increase their support for welfare programs that they could benefit from.

An important set of independent variables to consider are demographic statistics. As Baicker notes, the median voter cares about who receives public welfare assistance. In

particular, they prefer recipients to be similar to themselves so as to ensure that they can receive welfare should they need it (Baicker, 2001). Further, certain groups will be more likely to need public welfare. African Americans tend to utilize welfare more than other races, so they have a significant impact on welfare participation and as a result, one can expect more spending on social welfare with increasing African American populations (Soss et al, 2001; Wacquant, 2009). An increasing percentage also increases the likelihood that the median voter is African American which increases their support for welfare. It would also not be unreasonable to include the percentage of the population that is Hispanic since they are a large minority of the population and may not have the same characteristics as other demographics, so they may have an impact on welfare spending. Another factor to consider is the number of children and elderly (Baicker 2001).

Since TANF implies that a recipient has children, then it can be anticipated that more children as a percentage of the population implies more welfare spending. There are also some programs that provide assistance only to children. The number of children also correlates with the amount spent on education which affects budget allocations. Further, assuming the median voter has children or would like children, it can be assumed that they will support more funding for welfare if it benefits children. On the other hand, more elderly implies that there are fewer working aged individuals. It also impacts the ideals of the median voter. Another demographic variable to consider is the percentage of women who work since a working mother may require more child services and they will be eligible to receive welfare thus correlating with the amount spent on education and social welfare (Bentele and Nicoli, 2012); however, inclusion of this variable will depend on locating good data.

Another demographic variable to consider is the dropout rate which is correlated with poverty and welfare use, so higher dropout rates should result in higher budget allocations to social welfare programs (Li and Upadhyay, 2009). Unfortunately, dropout rates can be difficult to attain, but the percentage of the population with a secondary degree and the percentage with a bachelor's degree can be used as proxies. Delaney and Doyle (2011) found a relationship between welfare expenditure and these two variables since higher percentages for both should decrease welfare use and in turn welfare expenditure; however, a more educated populace may be more supportive of those experiencing poverty, so the median voter may get utility from increased public welfare expenditure despite the decrease in their own personal need for public welfare programs.

Final variables for consideration include political affiliations of the state government, the size of the total budget, and the voter turnout rate. One should consider the political makeup of a state since the Republican and Democratic parties differ on how they believe the state budget should be allocated (Bentele and Nicoli, 2012; Delaney and Doyle, 2011). In particular, the governor's party will be considered since the governor has budget authority at the state level and has the power to veto budgets put forth by the legislature. The size of the total budget will affect the allocations since some aspects of the budget are fixed and cannot be changed unlike other aspects. Thus, an increase in the size of the budget could allow for more spending on public welfare. Finally, voter turnout rates will be considered since it can impact the way

politicians behave. In particular, if voter turnout rates are low, they may become more ideological than if rates are high (Delaney and Doyle, 2011). Hence, I would expect lower voter turnout rates to lead to more drastic changes in welfare programs. Voter turnout rates also affect the odds that various demographics are represented by the median voter and in turn the support for public welfare programs.

Previous research has largely concluded that, with a few exceptions, spending on TANF has decreased since PRWORA went into effect (Hahn, Golden, and Stanczyk, 2012; Bentele and Nicoli, 2012). Research has also shown that PRWORA decreased caseloads, albeit very little (Danielson and Klerman, 2008). Combined, these results suggest that welfare reform has decreased state spending on TANF and traditional welfare programs, but say little about how budget shares have changed. Another implication is that Republican states should spend less on social services as a portion of the budget while Democratic states should spend more as a portion of the state budget based on careful reasoning and prior research showing that this variable impacts poverty and in turn need for welfare. Finally, based on research and logical reasoning, demographic, economic, and educational variables should impact budgetary allocations.

Empirical Model

The empirical model will include each budget category as a dependent variable with all other variables as the independent variables. The functional form of this model is based on prior research previously mentioned. In particular, it will closely follow the model used by Delaney and Doyle (2011) except public welfare expenditures will be specified as a share of the budget. This model is also very similar to the political economy model built by Baicker (2001). I will estimate a panel level generalized least squares model (GLS) to account for heteroskedasticity and autocorrelation if they are present. I expect that both will be present and will estimate a model using an AR1 autocorrelation structure and then estimate a model with a panel-specific AR1 autocorrelation structure.

The model is as follows:

$$Y_{it} = b_0t + b_1RMI_{it} + b_2U_{it} + b_3Age17_{it} + b_4Age65_{it} + b_5Black_{it} + b_6Hispanic_{it} + b_7Vote_{it} + b_8HS_{it} \\ + b_9Bach_{it} + b_{10}LNRev_{it} + b_{11}Rec_{it} + b_{12}RepGov_{it} + b_{13}PRWORA_{it} + e_{it}$$

With $1 \leq i \leq 50$ representing each of 50 states and $1991 \leq t \leq 2010$ representing each of 20 years of data. The dummy variables include the state governor's party, RepGov, which is denoted by 1 for years in which a Republican held the Governor's seat and 0 for years in which Democrat held the Governor's seat, a dummy variable for the Personal Responsibility and Work Opportunity Reconciliation Act of 1996 (PRWORA) where 1 denotes years after 1996 and 0 represents years before 1997, and a dummy variable for recessions, Rec, where 1 denotes recession years and 0 denotes non-recession years. RMI denotes real median income while U

represents yearly average unemployment rate. Age17 and Age65 represent the percentage of the population between the ages of 5 and 17 and the percentage of the population 65 and older respectively. Black and Hisp represent the percentage of the population that is Black and Hispanic respectively. Vote represents smoothed voter turnout in the prior year. Smoothing was achieved by calculating the average slope from two previous years and one coming year, excluding presidential elections, and then using the slope to calculate the missing third year. HS and Bach represent the percentage of the population with secondary degrees and bachelor's degrees respectively. LNRev represents the natural log of real revenue. It was put in logarithmic form to make it linear in the parameter as real revenue had a curve in the data when graphed in relation to public welfare expenditure as a percent of the budget. Finally, e represents a vector of error terms. Each variable constitutes an $it \times 1$ vector with it totaling to 1000. All real values are indexed with the consumer price index (CPI) where 1982-84 equals 100.

In order to test the primary hypothesis that PRWORA reduced state level spending on social welfare programs as the evidence suggests, the model includes a dummy variable for before and after the act went into place as well as a dependent variable representing the percent of the budget devoted to human resources which includes social welfare programs. Thus the coefficient on the dummy variable for PRWORA should be significantly less than 0 to support the alternative hypothesis and reject the null hypothesis that PRWORA had no effect or a positive effect on state budget allocations to human resources. We expect that the coefficient on the Republican dummy variable for the governor's party should be less than 0 since Republicans and Democrats have differing views on public welfare programs with Republicans being less favorable. If the coefficient is significantly less than 0, then it would support the alternative hypothesis and reject the null hypothesis that the governor's party has no effect on budget allocations to human resources.

Data

The data for my model is provided by the U.S. Census Bureau, the St. Louis Federal Reserve Federal Reserve Economic Data (FRED II), National Center for Educational Statistics, National Bureau of Economic Research, and the National Governor's Association. For each variable, there are 20 years of data for each state ranging from 1991 to 2010 for a total of 1000 observations. For data descriptions and summary statistics, see Appendices A and B. Note that the District of Columbia is excluded due to its small size, lack of statehood, and the extra influence the federal government has on its policy.

Annual total and public welfare expenditures for each state provided by the U.S. Census Bureau will be used to create a budget share proxy (in percent) for public welfare programs. Total budget expenditures will be indexed with the Consumer Price Index (CPI) provided by the St. Louis Federal Reserve FRED II with a base year of 1982-84. All expenditure data are for the fiscal year July 1- June 30. In addition to the expenditure data, total revenue statistics are provided by the same source and will be treated similarly. Total revenue will be indexed with the CPI.

Data on state unemployment rates (in percent of the labor force) are provided by FRED II. Unemployment rates have been averaged for the year in which expenditures began. Median income data is provided by the Census Bureau in March of each year. The data is in current dollars, but is indexed for inflation with the national CPI. Hence, all values are in real 1982-84 dollars.

All demographic data for percent of Blacks, Hispanics, and the age groups are provided by the U.S. Census Bureau. All data points are intercensal estimates, so they are rebased with each Census, so there may be some large variation at the end of each decade. The data includes the percent of the population that is Black, Hispanic, aged 5-17, and aged 65 and over respectively.

Voter turnout rates (in percent) are published by the U.S. Census Bureau after each election. To account for years during which no election occurs, data will be interpolated. Presidential elections will not be used for interpolation, but primary elections will be interpolated by using a moving average to attain values for non-election years. Presidential election years have higher turnouts than primary elections, so these years would skew the estimation upward.

Data on the percentage of the population with high school equivalent educational attainment and bachelor's degree respectively is provided by the National Center for Educational Statistics (NCES). All data ranges between 0 and 100 percent of the population. There were two years for which data was unavailable, so the data was smoothed by averaging between the years before and after the missing value.

Recessions are defined by the National Bureau of Economic Research (NBER), so a dummy variable for recession years is created with 1 representing recession years and 0 representing non-recession years. Any year with a quarterly recession is considered to be in a recession.

Information on when states had Republican Governors is provided by the National Governor's Association (NGA). Years with Republican Governors are denoted with 1 and non-Republican Governors are denoted with 0 to create a dummy variable. Independent Governors are treated as Democratic/non-Republican.

Finally, a dummy variable is created to represent years before and after PRWORA was enacted. Hence years before 1997 are denoted with 0 and years after 1996 are denoted with 1. This dummy variable will allow me to test my primary hypothesis that PRWORA resulted in decreased budget shares for public welfare. Data descriptions and summary statistics are available in Appendices A and B respectively.

Results

Before running any regressions, I first check for the presence of unit roots in the model. Since each variable has 1000 observations, a Harris-Tzavalis Test is used to test for the presence of unit roots (Harris and Tzavalis, 1999). The test yields a test statistic for public welfare's share of the budget of -3.9253 with a corresponding p-value less than 0.0001 which means that the null hypothesis that unit roots are present can be rejected at the 0.05 level; however I will still estimate a first difference model at the end since the number of years (20) is small for having a meaningful test. It may also be a more likely model since I am using panel data.

Multicollinearity is the first problem to deal with before running final regressions. To accomplish this, I check the variance inflation factors (VIFs) for a standard non-panel OLS regression of Public Welfare on all independent variables. All VIFs (found in Appendix C) are below 5, so it is reasonable to assume that multicollinearity is not a serious concern.

Before testing for heteroskedasticity and autocorrelation, I first check to see if the panel model has fixed effects or random effects. To compare the estimates from the random effects model and fixed effects model, I use a Hausman test with a null hypothesis of non-systematic differences in coefficients. The chi-squared statistic is 25.40 with a corresponding p-value of 0.0130 which is less than 0.05 so I reject the null hypothesis and estimate a fixed effects model with systematic differences across models. Thus, further tests will be performed with a fixed effects model.

Heteroskedasticity is the next problem I check for in the model. For this, I use a modified Wald Test where the null hypothesis assumes homoskedasticity. The test yields a chi statistic of 2024.27 with a corresponding p-value less than 0.0001. Thus, the null hypothesis is rejected at the 0.05 level, and I conclude that heteroskedasticity is present in the model. Corrections will be made for heteroskedasticity depending on whether or not autocorrelation is present in the model.

Autocorrelation is the final problem I check for in the model before running some final regressions. To detect the presence of first-order autocorrelation, I use a Wooldridge Test with a null hypothesis of no first-order autocorrelation. The test yields an F-statistic of $F(1, 49) = 80.051$ with a corresponding p-value less than 0.0001. Thus, I reject the null hypothesis at the 0.05 level and conclude that first-order autocorrelation is present in the model. Since both heteroskedasticity and first-order autocorrelation are present in the model, a GLS regression will be used to correct the model. Heteroskedasticity will be corrected by transforming the data. I will estimate the model first with an AR1 autocorrelation structure and then with a panel specific AR1 autocorrelation structure. If the panel specific AR1 autocorrelation structure reduces the standard errors, then I will use this structure for the final model.

Running a panel data AR1 GLS regression with Public Welfare expenditures as a percentage of the state budget regressed on all independent variables, I get the results specified in Table 1. Real median income, the unemployment rate, natural log of total revenue, the percentage of the population that is age 5-17, and the percentage of the population that is 65 and older are all significant at the 0.01 level. Welfare Reform, the voter turnout rate, the percentage of the population that has a bachelor's degree, and the constant are all significant at the 0.05 level. The percent of the population that is Hispanic is significant at the 0.10 level. Please note that STATA does not provide log likelihood for this particular regression.

Table 1. Panel Data GLS for Public Welfare Expenditure as a Percentage of Budget (PW)

AR1 autocorrelation structure

Independent Variable	Estimated Coefficient	Standard Error	p-value
Real Median Income (rmi)	-0.00011	0.00003	0.001***
Unemployment Rate (u)	0.19708	0.04846	0.000***
Percent Population Aged 5-17 (age17)	-0.42633	0.11389	0.000***
Percent Population Aged 65+ (age65)	0.53988	0.10225	0.000***
Recession (rec)	-0.09620	0.10174	0.344
Republican Governor (repgov)	-0.14516	0.14174	0.306
Welfare Reform (PRWORA)	0.40715	0.18042	0.024**
Percent Population Black (black)	0.03154	0.01965	0.109
Percent Population Hispanic (hisp)	0.03914	0.02175	0.072*
Smoothed Voter Turnout Rate (vote)	0.01010	0.00456	0.028**
Percent Population Secondary Degree (hs)	-0.02069	0.02689	0.442
Percent Population Bachelor's Degree (bach)	0.06456	0.02619	0.014**
Natural Log of Real Revenue (lnrev)	0.70755	0.17114	0.000***
Constant	11.19479	4.86670	0.021**
Chi Squared	272.18	p-value	0.0000
Number of Observations	1000		
Rho	0.7953		

***Significant at $\alpha=0.010$, **Significant at $\alpha=0.050$, *Significant at $\alpha=0.100$

Running a panel data panel specific AR1 (PSAR1) GLS regression with Public Welfare expenditures as a percentage of the state budget regressed on all dependent variables, I get the results specified in Table 2. Real median income, the unemployment rate, natural log of total revenue, the percentage of the population that is age 5-17, the percentage of the population that is 65 and older, the percentage of the population that is Hispanic, voter turnout, and the constant are all significant at the 0.01 level. Welfare Reform and the percentage of the population that has a bachelor's degree are significant at the 0.05 level. This model is much more efficient than the non panel specific AR1 model with smaller standard errors for most of the variables. Thus I will base my conclusions off this model with PSAR1.

Table 2. Panel Data GLS for Public Welfare Expenditure as a Percentage of Budget (PW)

PSAR1 autocorrelation structure

Independent Variable	Estimated Coefficient	Standard Error	p-value
Real Median Income (rmi)	-0.00012	0.00003	0.000***
Unemployment Rate (u)	0.16517	0.04409	0.000***
Percent Population Aged 5-17 (age17)	-0.47332	0.09756	0.000***
Percent Population Aged 65+ (age65)	0.53480	0.08947	0.000***
Recession (rec)	-0.14931	0.09231	0.106
Republican Governor (repgov)	-0.20495	0.12908	0.112
Welfare Reform (PRWORA)	0.38031	0.16209	0.019**
Percent Population Black (black)	0.00142	0.01526	0.926
Percent Population Hispanic (hisp)	0.05733	0.01880	0.002***
Smoothed Voter Turnout Rate (vote)	0.01194	0.00423	0.005***
Percent Population Secondary Degree (hs)	-0.02027	0.02484	0.414
Percent Population Bachelor's Degree (bach)	0.05974	0.02411	0.013**
Natural Log of Real Revenue (lnrev)	0.76517	0.16027	0.000***
Constant	12.36785	4.43349	0.005***
Number of Observations	1000		
Chi Squared	411.27	p-value	0.0000

***Significant at $\alpha=0.010$, **Significant at $\alpha=0.050$, *Significant at $\alpha=0.100$
Table 3. Elasticities for GLS with PSAR1 Autocorrelation Structure

Variable	Elasticity
Real Median Income	-0.1345
Unemployment Rate	0.04028
Percent Population Aged 5-17	-0.4055
Percent Population Aged 65+	0.3151
Percent Population Hispanic	0.02093
Smoothed Voter Turnout Rate	0.02740
Percent Population Bachelor's Degree	0.06838
Natural Log of Real Revenue	0.7652

The point elasticities for each variable are calculated in Table 3 above using the average values. All elasticities are inelastic. A 1percent increase in real median income, unemployment, voter turnout, and real revenue result in a 0.1345 percent decrease, 0.04028 percent increase,

0.02740 percent increase, and 0.7652 percent increase in the budget share for public welfare respectively. Similarly, a 1 percent increase in the percentage of the population aged 5-17, 65+, percentage of the population Hispanic, and percent of the population with a bachelor's degree result in a 0.4055 percent decrease, 0.3151 percent increase, 0.02093 percent increase, and a 0.06838 percent increase in the budget share for public welfare respectively. The elasticity for the percent of the population that is aged 5-17 is interesting because it suggests that an increase in the percent of the population that is aged 5-17 results in a large decrease in the budget share for public welfare. This could be explained by the large number of programs meant to benefit workers and get them back into the work force or the fact that children cannot vote. Similarly, the elasticity on the 65+ population is interesting as it suggests that an increase in the elderly population results in a large increase in the budget share for public welfare. Perhaps this is due to many elderly having low income, or perhaps it is due to high voter turnout among the elderly. Finally, in the years after PRWORA was implemented, states devoted 0.3803139 percent more of their budget to public welfare holding all else constant; however we assume this is 0 since it is not significant at the 0.05 level.

Now, I estimate a GLS model with the data transformed into first difference form in order to check the robustness of my results should there be a unit root problem present. There is no evidence of multicollinearity, but tests suggest that there is autocorrelation and heteroskedasticity. The results of this estimation are provided in Table 4 with the coefficients on the change model variables being far less significant than in the non-transformed model; however, since the unit root test is problematic, I do not feel comfortable choosing one model over another. Especially considering that the change model supports my hypotheses but the other model rejects them.

Table 4. Panel Data GLS for Change in Public Welfare Expenditure as a Percentage of Budget
PSAR1 autocorrelation structure

Independent Variable	Estimated Coefficient	Standard Error	p-value
Real Median Income (drmi)	-0.00004	0.00003	0.139
Unemployment Rate (du)	0.29738	0.03529	0.000***
Percent Population Aged 5-17 (d17)	-0.29361	0.18686	0.166
Percent Population Aged 65+ (d65)	-0.48735	0.28245	0.084*
Recession (rec)	0.23198	0.08700	0.008***
Republican Governor (repgov)	-0.10558	0.05928	0.075*
Welfare Reform (PRWORA)	-0.19932	0.08099	0.014**
Percent Population Black (dblack)	0.34889	0.26596	0.190
Percent Population Hispanic (dhispanic)	0.12714	0.10427	0.223
Smoothed Voter Turnout Rate (dvote)	0.00291	0.00360	0.418
Percent Population Secondary Degree (dhs)	0.03413	0.02569	0.184
Percent Population Bachelor's Degree (dbach)	0.03878	0.02274	0.088*
Real Revenue (drrev)	-3.46e-09	6.15e-09	0.574
Constant	0.22738	0.07368	0.002***
Number of Observations	950		
Chi Squared	114.52	p-value	0.0000

***Significant at $\alpha=0.010$, **Significant at $\alpha=0.050$, *Significant at $\alpha=0.100$

Looking at the first difference model, I notice that the estimated coefficients are what I expected with the 65+ age group being the only exception. Welfare reform is significant at the 0.05 level and suggests that it has been followed by a decrease in public welfare expenditure with a value of -0.1993242. This is in line with my earlier hypothesis. The coefficient for Republican Governor is also statistically significant at the 0.10 level with a value of -0.1055828 suggesting that states with Republican Governors spend less on public welfare programs. These results contradict the results that I estimated with an unchanged model. With this in mind, the unit root test takes on far more importance.

Testing the null hypotheses that PRWORA was followed by either an increase in the budget share for public welfare programs or no change in budget share, I get a t-statistic of 2.346 for the unchanged model and -2.461 for the first difference model. With a critical value of -1.646, I fail to reject the null hypothesis for the changed model but reject it for the first difference model. Testing the null hypotheses that state with Republican Governors devote either more of the budget to public welfare programs or do not behave in a way different than states with

Democrat Governors, I get a t-statistic of -1.588 for the unchanged model and -1.781 for the first difference model. With a critical value of -1.646, I fail to reject the null hypothesis for the unchanged model but reject it for the first difference model. This lends increased significance to the unit root test. Since the sample is small, the unit root test may be biased and could be the difference between rejecting or accepting my null hypotheses. I am, however, inclined to accept the first difference model since I would expect panel data to have unit roots. The first difference model would allow me to conclude that welfare reform and Republican Governors decrease public welfare expenditure, but more data or stronger tests are needed to reach a conclusion.

Conclusion

The results from the models are inconclusive. While I am able to reject the null hypotheses in one model, I cannot do so for the other model. With more data, the unit root test would be stronger and provide a more robust answer to which model to use. While the first difference model does confirm my hypotheses, I cannot accept the results since they are contradicted by the other model.

If states are decreasing their expenditures on traditional welfare programs like TANF, they may very well be transitioning to providing other public welfare services and increasing budget shares for public welfare programs. Increasingly, states are providing work programs and other opportunities that help the poor gain employment. They are also increasing spending on children that is not provided through traditional programs funded by the federal government. Essentially, states may be spending more on public welfare in ways that they see fit and less on programs funded by the federal government which has more control over how welfare is provided even though those programs have given states more control.

The results for the effect of Republican Governors on state budget shares for public welfare are not significant, but do suggest that the relationships may very well be as I expected. In further research, perhaps the party affiliation of the legislature should be considered instead since they do have some control over the budget. The status of the legislature may also better reflect the overall political climate in each particular state since the legislature has many members and may better reflect the population's beliefs assuming that gerrymandering does not skew representation by a disproportionate amount.

If welfare spending has not changed or has decreased since welfare reform in 1996, then this would justify looking into whether or not spending is more effective than in the past. I have not covered the impact of new programs on employment outcomes, but there is ample research on this topic. Outcomes after welfare reform compared to outcomes prior to welfare reform would give some indication of whether or not welfare reform has had its intended effect of increasing employment and decreasing poverty. Unfortunately, it does not appear that expenditures have had the intended effects meaning that there is still room to increase the efficiency of welfare expenditures at the current level or increase expenditure. I would encourage a re-evaluation of the effectiveness of welfare expenditures and reform in the future.

For further research, I would strongly suggest more data and more robust unit root testing

to determine the actual model. While I modeled state budget shares, it may be better to estimate per capita budget expenditures for each category and then estimate budget shares. Further, a seemingly unrelated regression model may account for cross equation correlation among different budget categories. This may provide better estimates for the variables. To truly understand its impact, research should shift focus away from traditional programs to analyzing newer programs that may have been created at the state level following PRWORA. These programs may give us a better understanding of the ways in which PRWORA affected public welfare expenditures and budget shares.

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Appendix A: Data Descriptions

Data Descriptions					
Label	Variable Name	Source	Period	Interval	Units
edu	Education Share	Census Bureau	1991-2011	Annual	Percent Total Budget
pw	Public Welfare Share	Census Bureau	1991-2011	Annual	Percent Total Budget
hhs	Health and Human Services Share	Census Bureau	1991-2011	Annual	Percent Total Budget
t	Transportation Share	Census Bureau	1991-2011	Annual	Percent Total Budget
ps	Public Safety Share	Census Bureau	1991-2011	Annual	Percent Total Budget
nr	Natural Resource Share	Census Bureau	1991-2011	Annual	Percent Total Budget
gg	General Government Share	Census Bureau	1991-2011	Annual	Percent Total Budget
rpcpi	Real Per Capita Personal Income	BEA	1991-2011	Annual	1982-84 US Dollars (CPI)
rmi	Real Median Income	Census Bureau	1991-2011	Annual	1982-84 US Dollars (CPI)
u	Unemployment Rate	FRED II	1991-2011	Monthly	Percent Labor Force
age17	% Ages 5-17	Census Bureau	1991-2011	Annual	Percent Population
age65	% Ages 65+	Census Bureau	1991-2011	Annual	Percent Population
rec	Recessions	NBER	1991-2011	Quarterly	1 = recession 0 = otherwise
repgov	Republican Governor	NGA	1991-2011	Annual	1 = Republican 0 = otherwise
prwora	Welfare Reform	Definition	1991-2011	Annual	1 = 1997-2010 0 = 1991-1996
black	% Black Population	Census Bureau	1991-2011	Annual	Percent Population
hisp	% Hispanic Population	Census Bureau	1991-2011	Annual	Percent Population

vote	Voting Rate	Census Bureau	1991-2011	Biennial	Percent Voters
hs	High School Degree	NCES and Census Bureau	1991-2011	Annual	Percent Population
bach	Bachelor's Degree	NCES and Census Bureau	1991-2011	Annual	Percent Population
lnrev	Total Revenue	Census Bureau	1991-2011	Annual	1982-84 US Dollars (CPI)

Appendix B: Summary Statistics

Summary Statistics

Variable	Mean	Std. Dev.	Min	Max
edu	31.71497	5.56796	16.06124	44.57982
pw	21.57985	4.61717	8.57837	38.77625
hhs	6.331841	2.135765	1.732085	12.69521
t	7.790372	2.504919	2.652209	17.07003
ps	3.580973	0.9897707	1.026232	7.288468
nr	2.231047	1.131453	0.559405	7.753741
gg	6.333153	2.438129	2.642531	16.39786
rpcpi	16319.18	2747.47	10097.16	26940.25
rmi	23779.28	3713.675	14886.87	34854.33
u	5.262258	1.588482	2.266667	13.41667
age17	18.48964	1.479017	15.26198	26.17463
age65	12.71359	1.882941	4.233294	18.54977
rec	0.25	0.4332294	0	1
repgov	0.514	0.5000541	0	1
prwora	0.7	0.4584869	0	1
black	10.21793	9.47035	0.3094804	37.21392
hisp	7.877765	8.973709	0.4742489	46.43977
vote	49.50953	9.194893	30.1	76.7
hs	84.459	4.85269	67.1	93
bach	24.69985	5.041054	11.4	40.4
lnrev	16.02718	0.9550004	13.91062	18.84764
corptax	0.0586116	0.0433623	0	0.3916251

Appendix C: Variance Inflation Factors

Variance Inflation Factors	
Variable	VIF
Real Median Income (rmi)	3.06
Unemployment Rate (u)	1.54
Percent Population Aged 5-17 (age17)	2.41
Percent Population Aged 65+ (age65)	2.49
Recession (rec)	1.18
Republican Governor (repgov)	1.09
Welfare Reform (PRWORA)	1.78
Percent Population Black (black)	2.16
Percent Population Hispanic (hisp)	1.84
Smoothed Voter Turnout Rate (vote)	1.42
Percent Population Secondary Degree (hs)	3.31
Percent Population Bachelor's Degree (bach)	3.48
Natural Log of Real Revenue (lnrev)	1.84